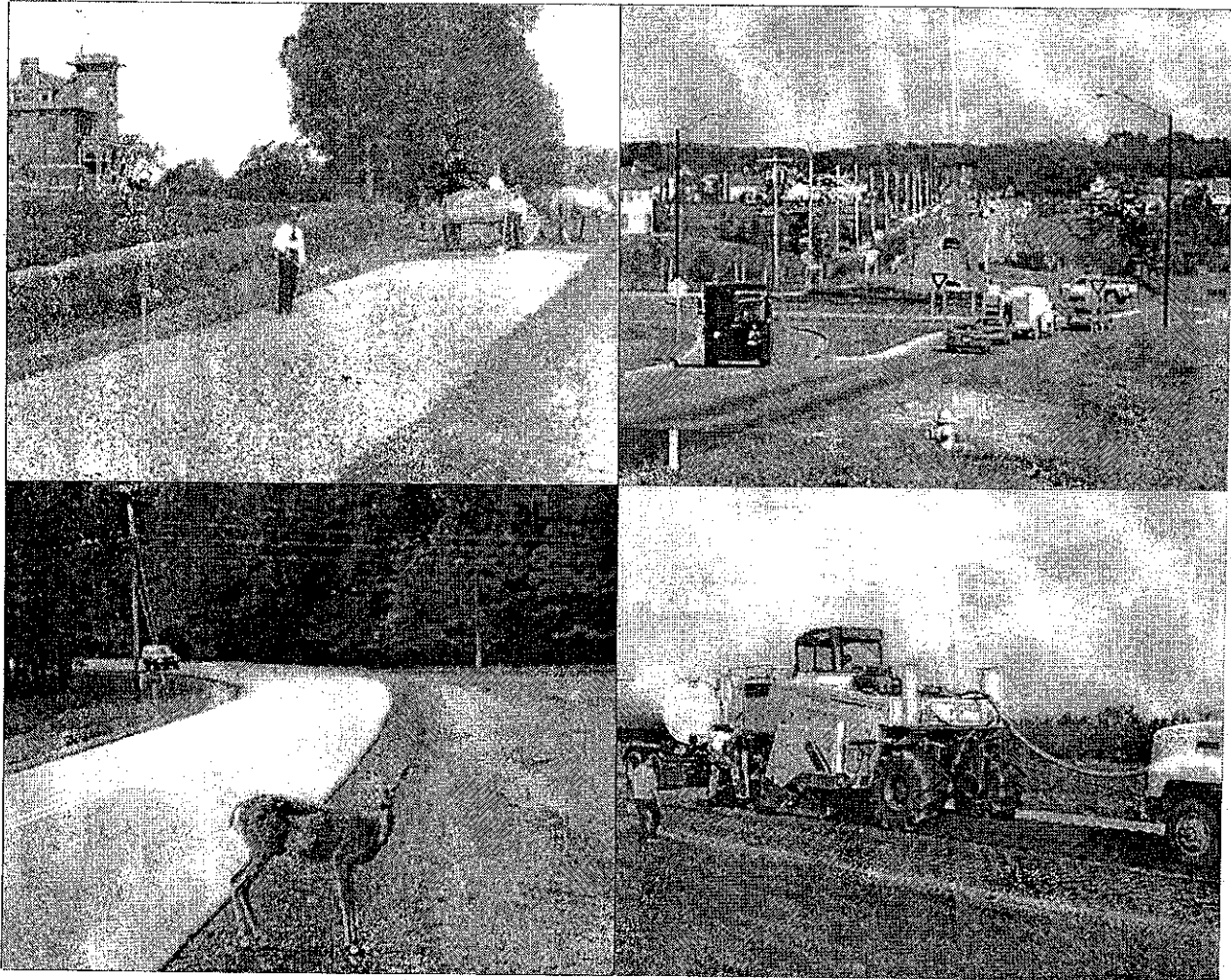


Bureau of Local Roads and Streets Manual



Illinois Department of Transportation
Division of Highways



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34-1.04 Design Vehicles

34-1.04(a) Types

The design vehicle affects the radius returns, left-turn radii, lane widths, median openings, turning roadways, and sight distances at an intersection. Typical design vehicles used for intersection design are:

- P — Passenger car; includes vans and pickup trucks.
- S-BUS-40 (S-BUS-12) — 84-passenger school bus.
- SU — Single-unit truck.
- WB-40 (WB-12) — Tractor/Semitrailer combination with an overall wheelbase of 40 ft (12.2 m).
- WB-50 (WB-15) — Tractor/Semitrailer combination with an overall wheelbase of 50 ft (15.2 m).
- WB-55 (WB-17) — Tractor/Semitrailer combination with an overall wheelbase of 55 ft (16.8 m).
- WB-65 (WB-20) — Tractor/Semitrailer combination with an overall wheelbase of 65 ft (19.4 m).
- P/T — Recreational vehicle, car, and camper trailer.

Chapter 36 of the *BDE Manual* and the *AASHTO Green Book* provide the vehicular dimensions and turning templates for each of the above design vehicles.

34-1.04(b) Selection

Figure 34-1G presents the recommended design vehicles at intersections based on the functional classification (see Section 27-3) of the intersecting highways from which and onto which the vehicle is turning. The design vehicles shown in Figure 34-1G are for new construction and reconstruction projects. Figure 34-1H presents the recommended truck type that should be used based on the Illinois "Designated State Truck Route System." For 3R projects, the design vehicle will be site specific, and it may be a design vehicle with a more restrictive turning radius than those for new construction and reconstruction projects.

In addition to Figure 34-1G, consider the following guidelines when selecting a design vehicle:

1. Minimum Designs. The SU and/or school bus design vehicles are generally the smallest vehicles used in the design of local intersections. This design reflects that, even in residential areas, garbage trucks, delivery trucks, and school buses will be negotiating turns with some frequency. Rural and suburban intersections that may serve school bus traffic should, at a minimum, accommodate a turning school bus without encroachment. Urban intersections only need to accommodate design vehicles that are expected to use that intersection.
2. Recreational Areas. Recreational areas typically will be designed using the SU design vehicle. This reflects that service vehicles are typically required to maintain the recreational area. Under some circumstances the passenger car with a trailer (P/T) may be the appropriate design vehicle (e.g., campground areas, boat launches).

For Turn Made		Design Vehicle ⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾
From	Onto	
Freeway Ramp	Other Facilities	WB-65 (WB-20)
Other Facilities	Freeway Ramp	WB-65 (WB-20)
Arterial	Arterial	WB-65 (WB-20)
	Collector	WB-55 (WB-17)
	Local	WB-50 (WB-15)
	Local (Residential)	SU*
Collector	Arterial	WB-55 (WB-17)
	Collector	WB-55 (WB-17)
	Local	WB-50 (WB-15)
	Local (Residential)	SU*
Local	Arterial	WB-50 (WB-15)
	Collector	WB-50 (WB-15)
	Local	SU*
	Local (Residential)	SU**
Local (Residential)	Arterial	SU*
	Collector	SU*
	Local	SU**
	Local (Residential)	SU**

*With encroachment, a WB-50 (WB-15) vehicle should physically be able to make the turn.

**With encroachment, the selected design vehicle should physically be able to make the turn.

Notes:

1. Use this Figure for new construction and reconstruction projects.
2. A smaller design vehicle may be considered after an investigation of conditions. Justification must be submitted for intersections with State highways.
3. For 3R projects, the design vehicle will be site specific. See Chapter 33.
4. A larger design vehicle may be required for intersections of two 80,000 lb (36,000 kg) truck routes.

**SELECTION OF DESIGN VEHICLE AT INTERSECTIONS
(Functional Classification)**

Figure 34-1G

Type of Truck Route	Design Vehicle	Maximum Length of Trailer Allowed (m)	Maximum Length Kingpin to Center Rear Axle (m)
Class I	WB-65 (WB-20)	53' (16.16 m)	45.5' (13.87 m)
Class II	WB-65 (WB-20)	53' (16.16 m)	45.5' (13.87 m)
Class III	WB-55 (WB-17)	53' (16.16 m)	42.5' (12.96 m)
Other State Highway	WB-55 (WB-17)	53' (16.16 m)	42.5' (12.96 m)
Local Roads and Streets	WB-50 (WB-15)	Not Specified	Not Specified

Illinois Statutes allow additional access off designated truck routes under different conditions. These are defined as follows:

1. *Any tractor/semitrailer vehicle operating on a Class I truck route shall have access onto any street or highway for a distance of 1 mile (1.61 km) from a Class I highway to load and unload and to allow the driver to obtain food, fuel, rest, or repairs. However, some local highway authorities may post truck restrictions altering this provision. Under this condition, the combination truck units allowed access off the Class I truck route may be up to 8 ft (2.59 m) wide with a 53 ft (16.16 m) long trailer.*
2. *Any tractor/semitrailer vehicle operating on a designated State highway (Class I, II, III, or Other State Highways) shall have access on another designated State highway for a distance of 5 mi (8.05 km) on such streets or highways to load and unload and to allow the driver to obtain food, fuel, rest, or repairs.*
3. *If local authorities designate any street or highway for the same large vehicles and the same uses as stated above, such large vehicles may also use these locally designated highways as truck routes. However, these large vehicles are prohibited from using all other streets and highways under local jurisdiction unless an exception is applicable. An exception would be applicable on a local highway where a combination truck unit is within 5 mi (8.05 km) of a designated truck route and where no restricted weight limit is posted on the local highway. In such cases, the combination truck unit may be up to 8 ft (2.59 m) wide, and can have an overall length of 65 ft (19.82 m).*

DESIGN VEHICLE SELECTION
(Designated State Truck Route System)

Figure 34-1H

3. Mixed Use. Some portions of an intersection may be designed with one design vehicle and other portions with another vehicle. For example, it may be desirable to design physical characteristics (e.g., corner islands) for the WB-65 (WB-20) truck but provide painted channelization for the SU design vehicle.

34-1.05 Pedestrians and Bicyclists

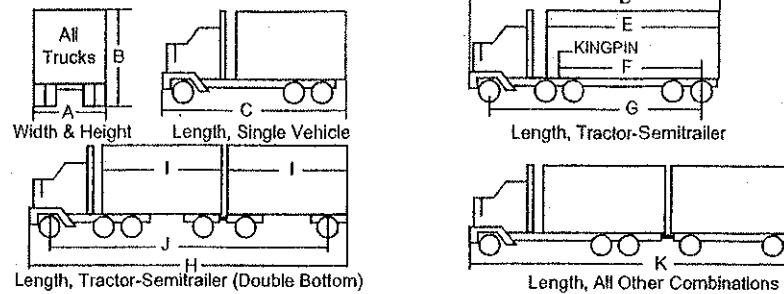
Safe and convenient movement of pedestrians and bicyclists through the intersection needs to be considered in the design of an intersection. However, this often causes conflicting objectives in the overall design of an intersection. Wider intersection designs to accommodate the design vehicle significantly increase the crossing distance for pedestrians. At signalized intersections, longer crossing times and conflicts with turning vehicles can significantly affect the overall capacity of the intersection. To reduce these problems, the geometric layout of the intersection may need to be revised, refuge islands included within the intersection, special turn lanes added for bicyclists, or other factors included in the design.

Section 41-6 discusses the application of curb ramps at intersections for disabled individuals. The *BDE Manual* and *ILMUTCD* provide several applications for accommodating bicycle lanes and pedestrians through an intersection.



Illinois Department of Transportation

TABLE I: Maximum legal dimensions of motor vehicles



Type of Highway or Street	Maximum Legal Dimensions											Maximum Weights		
	A	B	C	D	E	F ^①	G	H	I	J	K	Single Axle	Tandem Axle ^②	Gross ^③
Class I	8'-6"	13'-6"	42'	N.S.	53'	45'-6"	N.S.	N.S.	28'-6"	N.S.	60'	20,000	34,000	II
Class II	8'-6"	13'-6"	42'	N.S.	53'	45'-6"	N.S.	N.S.	28'-6"	65'	60'	20,000	34,000	II
Class III	8'	13'-6"	42'	65' ^①	53'	42'-6"	55' ^①	60'	N.S.	N.S.	60'	20,000	34,000	II
Other State Highway	8'	13'-6"	42'	65' ^①	53'	42'-6"	55' ^①	60'	N.S.	N.S.	60'	18,000	32,000	III
Local Roads and Streets	8'	13'-6"	42'	55'	N.S.	N.S.	N.S.	60'	N.S.	N.S.	60'	18,000	32,000	III

N.S. Indicates legal dimension not specified

Notes:

- ① 65 feet overall length (bumper to bumper) and/or 55 feet from center of front axle to center of rear axle.
- ② Tandem is defined as any 2 or more single axles whose centers are more than 40 inches and not more than 96 inches apart, measured to the nearest inch between extreme axles.
- ③ See tables II and III on reverse side.
- ④ Applies on semitrailers longer than 48 feet.

Exceptions to WIDTH requirements above:

- Above restrictions do not include certain safety devices approved by the Department.
- Household goods carriers shall have access to points of loading and unloading and may have a maximum width of 8 feet 6 inches.
- A maximum width of 8 feet 6 inches is allowed on any street or highway to any point of loading or unloading for vehicle combinations that include a trailer or semitrailer not exceeding 28 feet 6 inches in length, which was originally part of a truck tractor-semi-trailer-trailer combination (double-bottom).
- Width restrictions do not apply to vehicles transporting implements of husbandry operating in the daytime. Loads of hay, straw or other similar farm products are limited to a maximum of 12 feet.

Exceptions to LENGTH requirements above:

- Length limits do not apply to vehicles operating in the daytime, except on Saturdays, Sundays or legal holidays when transporting poles, pipes, machinery or other objects of a structural nature which cannot be readily dismembered, provided the length of the object being transported does not exceed 80 feet and the overall length of the load does not exceed 100 feet.
- Stinger-steered vehicles specifically designed to transport motor vehicles or boats may have an overall length of 75 feet plus overhang of 3 feet in front and 4 feet in the rear on Class I and II highways. Conventional auto transporters are vehicles specifically designed to transport motor vehicles or boats may have an overall length of 65 feet plus overhang on these highways. The maximum overall length on all other streets and highways is 60 feet.

GENERAL exceptions to above:

- All large vehicles operating on Class I highways shall have access for a distance of one mile on any street or highway to points of loading and unloading, and facilities for food, fuel, rest and repair.
- Large vehicles operating on designated state highways shall have access for a distance of 5 highway miles on any other state highway and on designated local streets and highways, to points of loading and unloading, and facilities for food, fuel, rest and repair. (This applies only on local streets and highways specifically designated and posted by local officials.)
- Permits may be issued for overdimensional objects and vehicles if they have been reasonably disassembled. Multiple objects loaded side-by-side, end-to-end or on top of each other may not cause the overdimension.

Special Haul Vehicles

See Table IV on reverse for additional information on Special Haul Vehicles

Type of Highway or Street	Maximum Legal Dimensions											Maximum Weights		
	A	B	C	D	E	F	G	H	I	J	K	Single Axle	Tandem Axle	Gross
Classes I, II, III	8'-6"	13'-6"	42'	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	60'	20,000	See ^④	See ^⑤
Other State Highways and Local Roads and Streets	①	①	②	②	②	②	②	②	②	②	②	③	④	⑤

Notes:

- ① 8' on Class III, Other State Highways and Local Roads and Streets.
- ② 55' on Local Roads and Streets, 65' from designated State Highway (5 mile access law).
- ③ 18,000 pounds on Other State Highways and Local Roads and Streets.
- ④ Greater than 72" and not more than 96" may carry 18,000 pounds on each axle.
- ⑤ Gross weight is determined by measuring to the nearest foot between extreme axles. (≤ 42' see Table III, > 42' see Table II)

TABLE II: Maximum gross weight for vehicles on Class I, II and III highways of the designated state highway truck route system. Based on federal bridge formula. All special conditions and exceptions are not included on this form.


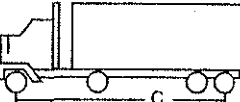
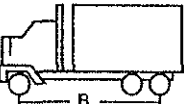
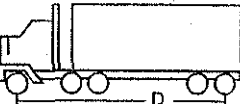
Maximum load in pounds on any 2 or more consecutive axles						Maximum loading for typical vehicles	
Distance ①	2 axles	3 axles	4 axles	5 axles ②	6 axles ②	Vehicle or Combination Maximum Weight - Pounds	
8	34,000	42,000					Axle 1 20,000
9	39,000	42,500					Axles 2,3 34,000
10	40,000	43,500					Axles 1,2,3 64,000
11		44,000					
12		45,000	50,000				Axle 1 20,000
13		45,500	50,500				Axle 2 20,000
14		46,500	51,500				Axles 3,4 34,000
15		47,000	52,000				Axles 1,2 40,000
16		48,000	52,500	58,000			Axles 2,3,4 54,000
17		48,500	53,500	58,500			Axles 1,2,3,4 66,000
18		49,500	54,000	59,000			
19		50,000	54,500	60,000			
20		51,000	55,500	60,500	66,000		Axle 1 20,000
21		51,500	56,000	61,000	66,500		Axles 2,3 34,000
22		52,500	56,500	61,500	67,000		Axles 3,4 34,000
23		53,000	57,500	62,500	68,000		Axles 1,2 40,000
24		54,000	58,000	63,000	68,500		Axles 2,3,4,5 68,000
25		54,500	58,500	63,500	69,000		Axles 1,2,3,4,5 80,000
26		55,500	59,500	64,000	69,500		
27		56,000	60,000	65,000	70,000		
28		57,000	60,500	65,500	71,000		Axle 1 20,000
29		57,500	61,500	66,000	71,500		Axles 2,3 34,000
30		58,500	62,000	66,500	72,000		Axles 3,4 34,000
31		59,000	62,500	67,500	72,500		Axles 1,2 40,000
32		60,000	63,500	68,000	73,000		Axles 2,3,4,5,6 80,000
33			64,000	68,500	74,000		
34			64,500	69,000	74,500		
35			65,500	70,000	75,000		
36			66,000	70,500	75,500		
37			66,500	71,000	76,000		
38			67,500	72,000	77,000		
39			68,000	72,500	77,500		
40			68,500	73,000	78,000		
41			69,500	73,500	78,500		
42			70,000	74,000	79,000		
43			70,500	75,000	80,000		
44			71,500	75,500			
45			72,000	76,500			
46			72,500	76,500			
47			73,500	77,500			
48			74,000	78,000			
49				78,500			
50				79,000			
51				80,000			

Notes:

- ① Measured to the nearest foot between the extremes of any group of two or more consecutive axles.
- ② Gross weights for 5 and 6 axles applicable only to a combination of vehicles.
- ③ Two consecutive sets of tandems may carry 34,000 pounds each providing the overall distance between the first and last axles of such consecutive sets of tandems is 36 feet or more.
- ④ If the distance between the centers of the first and third axles in a group of consecutive axles does not exceed 96 inches, the group is a tandem.
- ⑤ Maximum single axle 20,000 pounds; maximum tandem 34,000 pounds.
- ⑥ Combinations of vehicles designated as special haul vehicles which include a semitrailer manufactured prior to the model year 2004 and first registered in Illinois prior to January 1, 2005 having five axles with a distance of 42 feet or less between extreme may have a gross weight of 72,000 pounds provided the weight shall not exceed 18,000 pounds on a single axle or 32,000 pounds on a tandem. For such combinations manufactured subsequent to September 9, 1986, the minimum distance between the first and last axles of the two sets of tandems must be 18 feet 6 inches or more.
- ⑦ Permits may be issued for an overweight load providing it consists of one object that cannot be reasonably dismantled or disassembled.

See Table IV
below for additional
information on
Special Haul Vehicles

TABLE III: Maximum gross weight of vehicles not on the designated State highway truck route system.

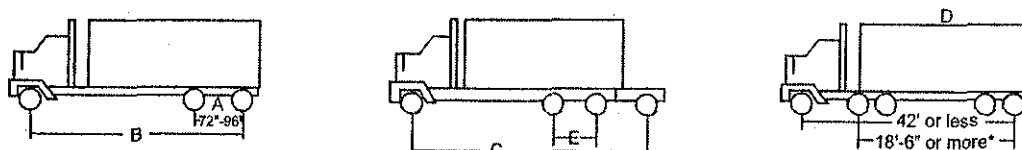
	Gr. Wt. 36,000 (See note 1)		Vehicle or Combinations		
	B Gr. Wt.		C Gr. Wt.	C Gr. Wt.	
	10' - 41,000		16' - 46,000	15' - 50,000	26' - 57,500
	11' - 42,000		17' - 47,000	16' - 50,500	27' - 58,000
	12' - 43,000		18' - 47,500	17' - 51,500	28' - 58,500
	13' - 44,000		19' - 48,000	18' - 52,000	29' - 59,500
	14' - 44,500		20' - 48,500	19' - 52,500	30' - 60,000
	15' - 45,000		21' - 49,000	20' - 53,500	31' - 60,500
	22' - 54,000		32' - 61,000	21' - 54,000	32' - 61,500
	23' - 55,000		34' - 62,000	22' - 54,500	33' - 62,000
	24' - 56,000		35' - 63,000	23' - 55,500	34' - 62,500
25' - 56,500	36' - 64,000	24' - 56,000	35' - 63,500		
	or more		36' - 64,000	or more	
			Combinations		
			D	Gr. Wt.	
			42' or less	72,000	
			43'	73,000	
			44' or more	73,280	

Notes:

Notes:

1. Either axle on a two-axle vehicle may weigh 20,000 pounds providing the gross weight of the vehicle does not exceed 36,000 pounds and the vehicle is not part of a combination.
2. Maximum single axle 18,000 pounds; maximum tandem axle 32,000 pounds.
3. Permits may be issued for an overweight load providing it consists of one object that cannot be reasonably dismantled or disassembled.

TABLE IV: Special Axle and Gross Weight Allowances for Special Haul Vehicles



Designated Truck Route System (Class I, II & III State Highways)

- 18,000 lbs. on each axle - total of 36,000 lbs.
- See Table II
- See Table II
- Gross weight of 72,000 lbs., provided the weight shall not exceed 18,000 lbs. on a single axle or 32,000 lbs. on a tandem.

Other State Highways and Local Roads & Streets

- 18,000 lbs. on each axle - total of 36,000 lbs.
- See Table II
- See Table II
- Gross weight of 72,000 lbs., provided the weight shall not exceed 18,000 lbs. on a single axle or 32,000 lbs. on a tandem.
- 18,000 lbs. on each axle - total of 36,000 lbs.

*This requirement does not apply to semitrailers manufactured before September 9, 1986.

Note: Special Hauling Vehicles must meet width, height and length requirements as specified in Table I.

Maps of the designated state highway truck route system are available by calling 217/782-6271